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LITERATURE REVIEW

The Physical Properties of Compost

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The trend toward more efficient methods of compost production and handling requires a complete understanding of the process, the materials involved, and the physical parameters of the materials such as moisture content, bulk density, and various mechanical properties. These properties influence the process and product in various ways from aeration effectiveness to compost-soil interactions. This paper reviews the influence of the physical properties of composting materials on the production and utilisation of compost. Methods for measuring moisture content, bulk density, particle size distribution, airflow resistance and the thermal and optical properties of compost are summarised. In addition to techniques for determining theses properties, typical values for particle density, porosity, and mechanical and electrical properties of composting materials are presented. Empirical formulas also are included for bulk density, particle density, free air space, and specific heat capacity, as cited in the reviewed literature. In the majority of cases, there is a lack of a specific standard for describing and measuring compost physical properties. In order to achieve uniformity in reporting and comparability of data from various sources, acceptable standard methods of measuring compost properties need to be adopted.

Introduction

Physical properties play an important role in every stage of compost production as well as the handling and utilization of the end product. From the mixing of various feedstocks and process monitoring and maintenance to the packaging and shipping of the final product, parameters such as bulk density, porosity and thermal conductivity dictate the requirements for the optimum composting environment and the design of machinery used in the system.

In order to design a material processing or handling system, it is important to have information on the nature of the materials involved and how the characteristics of the materials affect the process and the components of the system. In the case of compost production, this information demands an understanding of the process as well as the physical means of facilitating the process. A useful description of how physical and biological parameters are brought together in the design of composting systems is provided by Keener *et al.* (1993) in their description of design optimization.

The design of a process should also include a description of the desired product. Such a description should include physical and chemical characteristics that are likely to be related to the intended use of the product. Thus, desired physical properties of compost are a function of the end use of the product.

This paper firstly reviews the influence of the physical properties of composting materials on the production and utilisation of compost. The properties reviewed include moisture content, bulk density, particle size, porosity, and airflow resistance, as well as thermal, electrical, mechanical and optical properties. Secondly, literature relevant to these compost physical properties is reviewed to outline the extent of current knowledge and to identify where research is required. To consider the influence and significance of physical properties on the overall composting system, it is con-